

Phase Changing Materials: Intelligent temperature management for buildings.

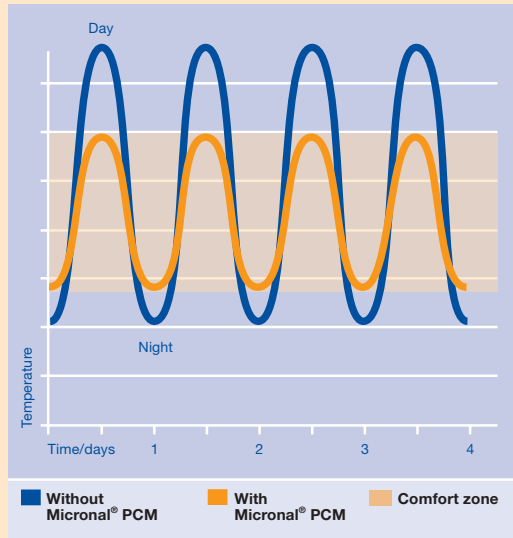
MICRONAL[®] PCM

Old buildings such as castles and churches maintain a constant indoor temperature regardless of the weather because their walls are thick and they can store a great deal of heat energy. Modern buildings, on the other hand, are of lighter construction. Lower mass unfortunately also means less comfort. Overheated rooms in the summer are what we have to accept for less expenditure on materials. This is no longer necessary, because novel lightweight building materials with phase changing materials actively even out the temperature while taking up little space. The periods in which one can enjoy a comfortable indoor climate are decidedly longer.

**BASF**

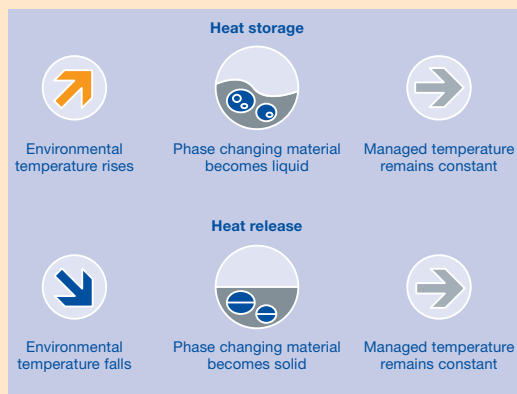
The Chemical Company

Optimised room temperature



Active climate control: Phase changing materials reduce temperature peaks.

How phase changing materials work



Temperature management:

The added advantage for conventional building materials

Through a physical trick, building materials can now store extra latent heat. For example, a revolutionary new wall plaster, incorporating one third phase changing material, has the same heat storage capacity as a 23 cm thick brick wall in the critical temperature range for living comfort of 22 to 26 °C. Additionally, phase changing materials can be integrated into both solid and liquid materials.

As an integral component of wall plaster, paint or plasterboard, they function as temperature controllers and in dry lining they exhibit an equalizing effect on room temperature.

High-Tech in microcapsules

The functionality of phase changing materials is similar to that of ice cubes. In a drink ice extracts heat until it has melted. As a result, the temperature remains at a constant 0 °C. Phase changing materials operate in the same way, but they consist of other materials which allow for a wider selection of melting points.

Microscopically small polymer spheres contain a wax storage medium in their core. On heating and cooling, the wax in the reservoir capsules melts and solidifies respectively. In this way, the environmental temperature is regulated. When the temperature rises, the phase changing materials absorb heat and when the temperature falls, they emit heat. During the phase change, the temperature remains constant. This stored heat which is “disguised” in the phase change is known as latent heat. It is a reversible process which occurs within the melting range of the wax. As soon as the melting temperature is exceeded, the microcapsules begin their “work”.

Phase changing materials can therefore absorb energy, store it and release it again later. Their advantage is the small amount of space and weight the materials need in order to provide a high heat storage capacity. In addition, they can be deployed in any shape, bulky storage units are unnecessary.



Micronal® PCM – Intelligent temperature management for buildings



The demands on a comfortable indoor climate change with the seasons.

In summer it should be cooler inside than outside, in winter the room should be comfortably warm. A building material modified with Micronal® PCM phase changing material is able to perform active temperature management and maintain the air temperature of the room at the melting point of the wax for the duration of the phase change.

Nature takes care of the periodic sequence of melting and solidification, or charging and discharging, through the temperature difference between day and night.

Energy saving in the 3 litre house



In a pilot project by BASF, plaster and filler containing Micronal® PCM were applied in several rooms of an old building. The influence of the phase changing material in the plaster and filler on the indoor climate is measured continuously.

Through the collective effect of all the improvements, less than three litres of heating oil per year were consumed per square metre of living space. By way of comparison the current Heat Isolation Ordinance dictates no more than roughly seven litres per square metre in living space.

The 3 litre house – an example of modernisation of an old building.

Addresses

USA/America

BASF Corporation
RBU Functional Polymers NAFTA
11501 Steele Creek Road
Charlotte, N.C. 28273
USA
Phone: (1) 704-588-52 80
Fax: (1) 704-587-81 57

South America

BASF S.A.
Estrada Samuel Aizemberg, 1707
09851-550 Sao Bernardo do
Campo-SP
Brazil
Phone: (55) 11 43 43-21 75
Fax: (55) 11 43 43-28 60

South East Asia

BASF South East Asia Pte. Ltd.
7 Temasek Boulevard
35-01 Suntec Tower One
Singapore 038987
Singapore
Phone: (65) 63 37 - 03 30
Fax: (65) 64 30-98 25

BASF Aktiengesellschaft
Regional Business Unit
Adhesive and Construction Industry Europe
Sales Construction Chemicals
67056 Ludwigshafen, Germany

www.basf.de/dispersionen
E-mail: construction_chemicals@basf-ag.de

For further information please contact us on our toll-free numbers and you will automatically be transferred to your regional contact person:

Phone: 00 800 - 227 66 257 or 00 800 - ACRONALS
Fax: 00 800 - 227 66 253 or 00 800 - ACRONALF